

Outbreak Summary 2002: Norovirus Takes Center Stage

Pam Pontones, MA
ISDH Epidemiology Resource Center

The main objective of any communicable disease outbreak investigation is to identify the infectious agent and the causative factors in order to control the outbreak and prevent further disease transmission. Thorough investigations can also monitor emerging trends and provide a knowledge base to prevent similar occurrences in the future. Therefore, outbreaks or clusters of unusual disease incidence are reportable to the Indiana State Department of Health (ISDH) [IAC 410 1-2.3]. Outbreak investigations should be a collaborative effort between the local health departments and ISDH. It is the local health department's responsibility to notify ISDH of the outbreak and to perform the majority of investigative procedures, while the role of the ISDH is mainly coordination and consultation. In large or complex outbreak situations, the ISDH may provide direct or on-site assistance.

This narrative describes only those outbreak investigations in which the ISDH Epidemiology Resource Center participated. The ERC investigated a total of 33 outbreaks in 2002 (Table 1), double the number of outbreaks investigated in 2001. This was due largely to the increased number of viral gastroenteritis outbreaks investigated (see below).

Of the reported outbreaks, one was respiratory and 31 were gastrointestinal. Of the gastrointestinal outbreaks, 14 were foodborne, 16 were spread by person-to-person contact, and one had no conclusive transmission route. No waterborne outbreaks were reported in 2002. The Food Protection Program and Long Term Care Program, in addition to lending valuable expertise and experience during outbreak investigations, also investigate a substantial number of food-related complaints and other clusters of illness for which the ERC never becomes involved.

Respiratory

An outbreak of pertussis occurred during 2002 in LaGrange County among a poorly vaccinated population. A total of 52 cases were reported during the year, with the majority (46) having cough onset from July-November, with only two cases being reported in December. Thirty-six of the cases (69%) were in the 1-10 year age group, with another 9 cases (17%) under one year of age. Only two of the cases (4%) were 20 years or older and the 5 other cases (10%) were ages 11-19. Twenty-five of the cases that were between 1-10 years of age had not received any pertussis-containing vaccine. Thirty-two (61.5%) of the cases were female, 20 (38.5%) were male, and all were of the white race. Ten of the cases were confirmed by culture.

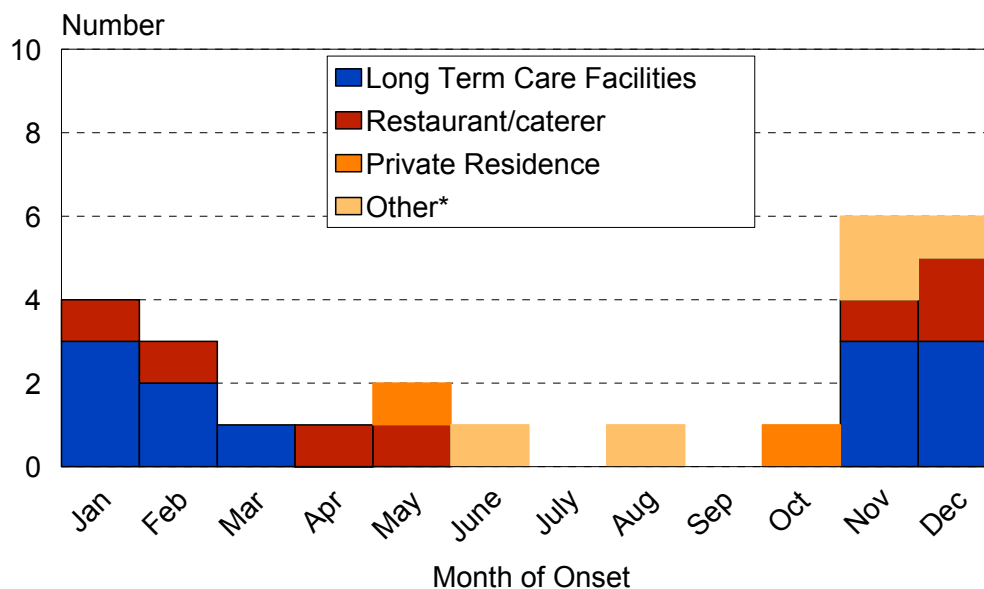
Gastrointestinal

Viral

In 2002, the genus name Norovirus was created to include Norwalk and Norwalk-like caliciviruses. More outbreaks investigated in 2002 were attributed to noroviruses than any other agent. Fifteen confirmed and 12 suspected outbreaks of norovirus occurred in Indiana, almost double the number of viral outbreaks investigated in 2001. Settings included long-term care facilities, restaurants/caterers, homes, retreat centers and hotels, and hospitals (see Figure 1). The setting could not be conclusively determined for one outbreak.

Figure 1.

Viral Gastroenteritis Outbreaks By Month of Onset (n = 27)



*includes hospitals, hotels, retreat center, and workplace

Noroviruses are the most common causes of acute gastroenteritis in the U.S., and are easily transmitted by contaminated food and beverages. Foodborne viral outbreaks usually occur when an infected person handles raw foods (salads, vegetables, etc.) or ready-to-eat foods (sliced luncheon meats, rolls, etc.) without thoroughly washing hands after using the restroom. Due to the extremely infectious nature of viral agents, noroviruses can also easily be transmitted from person to person via contaminated hands or surfaces, and evidence suggests that these viruses may also be transmitted through inhalation of vomitus. Ten of the outbreaks were foodborne and sixteen were attributed to person-to-person contact. In most outbreaks, there was a background of illness among food handlers or contact with others ill prior to the outbreak. The inoculum dose is extremely low, and those infected can continue to shed virus in stool up to two weeks after symptoms cease. Symptoms include watery diarrhea, nausea and vomiting, generally within 24-48 hours after exposure.

The increase in the number of viral outbreaks was largely due to a novel strain of Norovirus that emerged in 2002. This strain was responsible for large outbreaks on cruise ships and in several other states, particularly in institutional settings. This strain was named the “Farmington Hills” strain after the area in Michigan where the first cases with the new strain were identified. Several of the norovirus outbreaks reported occurred in the late fall (see figure 1), the same time when an increase in norovirus outbreaks was reported from other states.

Bacterial Intoxications

In February, an outbreak occurred among coworkers who ate at a local restaurant. Four cases were identified, but specimens for laboratory testing were not available. According to the clinical information provided, if the outbreak was foodborne, illness was most likely an intoxication caused by *Staphylococcus aureus* or *Bacillus cereus*. Several food samples tested negative for *S. aureus* and *B. cereus*, and plate counts tested within normal limits. Alternatively, the outbreak may also have been related to a common exposure within the workplace and caused by a different agent.

Three outbreaks caused by *Clostridium perfringens* were confirmed in 2002. *Clostridium perfringens* is a bacterium found in soil and the gastrointestinal tract of healthy people and animals, including cattle, pigs, poultry and fish. The bacterial cells form spores that allow the organism to survive periods of environmental stress, such as temperature extremes and dryness. Illness occurs when food contaminated by soil or feces is held under conditions favorable for multiplication of the organism, and illness is usually associated with inadequately heated, cooled or reheated “dense” foods such as meats, stews and gravies. Once ingested, the organism replicates in the gastrointestinal tract and produces an enterotoxin that causes the characteristic symptoms. The illness is not transmissible person-to-person.

In April, 26 cases were identified at a county jail. Illnesses were confined to one area of the jail. Two cases tested positive. Although food samples from the statistically implicated meal tested negative for *C. perfringens*, a sample of chicken a la king had a high aerobic plate count, an indicator of possible mishandling or temperature abuse. Since meals were prepared in a central kitchen and transported to different cell blocks, slow cooling may have occurred during transport, allowing bacterial growth and subsequent toxin release into the food. Although the chicken a la king tested negative for *C. perfringens*, toxins and pathogens are often unequally distributed in food.

Forty-four cases were identified in an outbreak at a state correctional facility in November. Illnesses were confined to three areas of the facility. Two cases tested positive for *C. perfringens*, and food samples from the implicated meal had high aerobic plate counts and coliform counts, indicators of possible temperature abuse and improper hygiene. Since meals were prepared in a central kitchen and transported to different cell blocks, slow cooling may have occurred during transport, allowing bacterial growth and subsequent toxin release into the food. Food samples tested negative for *C. perfringens*; however, statistical analysis revealed refried beans as the most likely vehicle.

An outbreak associated with a catered dinner at a workplace also occurred in November. Twenty-nine cases were identified, and one tested positive for *C. perfringens*. Mashed potatoes from the dinner tested positive for *C. perfringens*, turkey and potatoes had high aerobic plate counts, and turkey, potatoes and stuffing had high coliform counts. Statistical analysis to identify a food vehicle could not be performed due to the limited number of controls, but the anecdotal evidence indicted that the turkey was the most likely vehicle. Although the turkey tested negative for *C. perfringens*, bacteria were most likely introduced to other food items through cross-contamination. The exact mechanism of bacterial proliferation was not identified, however, the process for thawing the turkey may have played a role.

Bacterial Infections

In February, an outbreak of *Shigella dysenteriae* was confirmed. *S. dysenteriae* is usually associated with developing countries but rare in the United States. Foodborne outbreaks of shigellosis usually occur when an infected person handles raw or ready-to-eat foods without thoroughly washing hands after using the restroom. Due to the extremely infectious nature of the bacteria, shigellosis can also easily be transmitted from person to person via contaminated hands or surfaces. The inoculum dose is extremely

low (10-100 bacteria), and without proper antibiotic treatment, bacterial shedding can continue up to one month after symptoms cease.

Three cases were identified, all of whom ate at the same restaurant within two days of each other. All three tested positive for *Shigella dysenteriae* serotype 9. PFGE analysis indicated that two cases had identical band patterns, and one case differed by only one band, strongly indicating a common source. No common food item was identified. One employee reported traveling to an endemic country and returning to work the day one of the cases ate at the restaurant. This employee reported having gastrointestinal symptoms consistent with shigellosis during and after return from the trip and continued to work as scheduled. Although the employee did not directly prepare food, the employee did assist other staff members with serving food once it was prepared. The employee did not seek medical attention during illness. A follow-up stool specimen tested negative, however, this was collected several weeks after illness, and shedding had likely stopped. No other employees reported illness or overseas travel.

Outbreak Investigation

Based on experiences in disease investigation, the ISDH makes the following recommendations to local health departments for efficient and scientifically sound disease investigations:

- ▶ *Maintain supplies for outbreak investigations.* **Local health departments should have adequate supplies necessary for outbreak investigations.** Containers for collecting stool specimens specific for bacterial and viral pathogens (7A) should be readily available. Be sure to check the expiration dates on the containers. **New containers can be ordered or expired ones replaced by calling the ISDH Containers Section at (317) 233-8104. Call (317) 233-7740 for information regarding specimen collection for respiratory outbreaks.**
- ▶ *If an outbreak is suspected, contact the ISDH field epidemiologist in your district as soon as possible.* Gather basic information about the outbreak beforehand. For foodborne outbreaks, this information includes:
 - ☐ Type of event, location, date, number of meal(s) served and time of meal(s)
 - ☐ Source of food served (caterer, home, etc.) and contact person for the source
 - ☐ Number of exposed persons
 - ☐ Number of known ill persons
 - ☐ Range and times of illness onset
 - ☐ Main symptoms
 - ☐ Contact person for ill persons and phone number, if possible
 - ☐ Menu of all food and beverage items served
 - ☐ Availability of clinical and food samples

For respiratory outbreaks, obtain the following information:

- ☐ Location of outbreak
- ☐ Number of known ill persons
- ☐ Range and times of illness onset
- ☐ Main symptoms
- ☐ Contact person for ill persons and phone number, if possible
- ☐ Any laboratory results already obtained by private physicians
- ☐ Availability of clinical samples (i.e., are people still becoming ill)

- ▶ *Ensure that everyone involved in the process is working together.* This may involve initial and even daily meetings among environmental and nursing staffs. Public health nurses and environmental health specialists each have a critical role to play in outbreak investigations.

<i>Contributor to this article:</i>	<i>Wayne Staggs, Vaccine-Preventable Disease Epidemiologist</i>
--	--

**SUMMARY OF DISEASE OUTBREAKS INVESTIGATED
BY THE ISDH EPIDEMIOLOGY RESOURCE CENTER
INDIANA, 2002**

Month	County	Site	Description	Organism ¹	Most probable source	Local Participation	Comments ²
January	Johnson	Long-term care facility	Gastroenteritis 11 cases	Norovirus	Unknown	Johnson CHD	2 cases confirmed
January	Marion	Long-term care facility	Gastroenteritis 85 cases	Unknown	Community	Marion CHD	Probably viral
January	Vanderburgh	Restaurant	Gastroenteritis 21 cases	Unknown	Infected staff member	Vanderburgh CHD Posey CHD	Probably viral
January	Vanderburgh	Long-term Care facility	Gastroenteritis 72 cases	Norovirus	Community	Vanderburgh CHD	4 cases confirmed
February	Lake	Long-term care facility	Gastroenteritis 24 cases	Unknown	Community	Lake CHD	Probably viral
February	Bartholomew	Restaurant	Gastroenteritis 3 cases	<i>Shigella dysenteriae</i>	Infected staff member	Bartholomew CHD Brown CHD Jennings CHD	3 cases confirmed
February	Sullivan	Long-term care facility	Gastroenteritis 16 cases	Unknown	Community	Sullivan CHD	Probably viral
February	DeKalb	Restaurant or workplace	Gastroenteritis 4 cases	Unknown	Unknown	DeKalb CHD	Transmission route unknown
February	Monroe	Restaurant	Gastroenteritis 20	Norovirus	Infected staff member	Monroe CHD	1 case confirmed
March	Marion	Long-term Care facility	Gastroenteritis 18 cases	Norovirus	Community	Marion CHD	2 cases confirmed
April	Marion	Correctional facility	Gastroenteritis 26 cases	<i>Clostridium perfringens</i>	Chicken a la king	Marion CHD	2 cases confirmed
April	Ripley	Restaurant	Gastroenteritis 23 cases	Unknown	Infected staff member	Ripley CHD	Probably viral
May	Howard	Restaurant	Gastroenteritis 31 cases	Norovirus	Infected staff member	Howard CHD	1 case confirmed
May	Marion	Private residence	Gastroenteritis 9 cases	Norovirus	Infected family member	Marion CHD	1 case confirmed
June	Clark	Retreat center	Gastroenteritis 20 cases	Unknown	Community	Clark CHD	Probably viral
July	LaGrange	Community	Respiratory infection 46 cases	<i>Bordetella pertussis</i>	Infected case	LaGrange CHD	10 cases confirmed

Month	County	Site	Description	Organism ¹	Most probable source	Local Participation	Comments ²
August	Orange	Hotel	Gastroenteritis 10 cases	Norovirus	Infected family member	Orange CHD	3 cases confirmed
October	Steuben	Private residence	Gastroenteritis 13 cases	Unknown	Unknown	Steuben CHD DeKalb CHD	Probably viral
November	LaPorte	Correctional facility	Gastroenteritis 44 cases	<i>Clostridium perfringens</i>	Refried beans	LaPorte CHD	2 confirmed cases
November	White	Factory	Gastroenteritis 29 cases	<i>Clostridium perfringens</i>	Turkey	White CHD	1 confirmed case
November	Marion	Hotel	Gastroenteritis 34 cases	Unknown	Unknown	Marion CHD	Probably viral
November	Vanderburgh	Restaurant	Gastroenteritis 10 cases	Norovirus	Infected staff member	Vanderburgh CHD	5 confirmed cases
November	Porter	Long-term care facility	Gastroenteritis 7 cases	Unknown	Community	Porter CHD	Probably viral
November	Vanderburgh	Long-term care facility	Gastroenteritis 46 cases	Norovirus	Community	Vanderburgh CHD	5 confirmed cases
November	Lake	Hospitals	Gastroenteritis 34 cases	Norovirus	Infected staff member	Lake CHD East Chicago CHD	5 confirmed cases
November	Vanderburgh	Long-term care facility	Gastroenteritis 23 cases	Norovirus	Community	Vanderburgh CHD	2 confirmed cases
December	Monroe	Long-term care facility	Gastroenteritis 48 cases	Norovirus	Community	Monroe CHD	1 confirmed case
December	Vanderburgh	Long-term care facility	Gastroenteritis 50 cases	Norovirus	Community	Vanderburgh CHD	7 confirmed cases
December	Marion	Restaurant	Gastroenteritis 8 cases	Unknown	Unknown	Marion CHD	Probably viral
December	Marion	Restaurant	Gastroenteritis 16 cases	Norovirus	Infected staff member	Marion CHD	1 confirmed case
December	Tippecanoe	Hospital	Gastroenteritis 27 cases	Norovirus	Infected staff member	Tippecanoe CHD	4 confirmed cases
December	Lake	Long-term care facility	Gastroenteritis 43 cases	Unknown	Community	Lake CHD	Probably viral

1. Organisms culture-confirmed from stool samples, foods, other environmental sources, or determined by serologic testing.

2. Assessment of likely etiology based on incubation period, distribution of cases, and spectrum of symptoms shown.